

Figure 2-6. National DIP concentration data (U.S. EPA/NCA).

Chlorophyll *a*

One of the symptoms of degraded water quality condition is the increase of phytoplankton production, as measured by the concentration of chlorophyll *a*. Chlorophyll *a* is a measure used to indicate the amount of microscopic algae (or phytoplankton) growing in a waterbody. High concentrations of chlorophyll *a* indicate the potential for problems related to overproduction of algae. High concentrations of summertime chlorophyll *a* occurred in only 8% of estuarine waters (Figure 2-7), resulting in an overall national rating of good. Moderate concentrations occurred in an additional 41% of estuarine waters. Only one region of the country, Puerto Rico, received a rating of poor, with 29% of its waters exceeding the summertime reference condition. Moderate increases in summertime chlorophyll concentrations occurred most often in Southeast Coast (with 83% of estuarine waters exceeding poor or fair guidelines), Northeast Coast (50%), and Gulf Coast (46%) estuaries. None of the estuaries in these regions experienced large expanses of poor conditions (Southeast = 3%, Northeast = 15%, and Gulf of Mexico = 8%).

Water Clarity

The overall water clarity of the nation's estuaries is rated fair. Three different regional reference conditions were established for measuring conditions:

Reference Condition (ambient surface light that reaches a depth of 1 meter)	Area Type
5%	Areas having high natural levels of suspended solids in the water (e.g., Louisiana, Delaware, Mobile Bay, Mississippi estuaries) or extensive wetlands (e.g., South Carolina, Georgia).
20%	Areas having extensive SAV beds (e.g., Florida Bay, Indian River Lagoon, and southern Laguna Madre) or desiring to reestablish SAV (e.g., Tampa Bay).
10%	The remainder of the country.

NCA estimates indicate that 25% of the nation's estuaries do not meet these reference conditions (Figure 2-8). Locations with poor water clarity are distributed throughout the country, but the regions with the

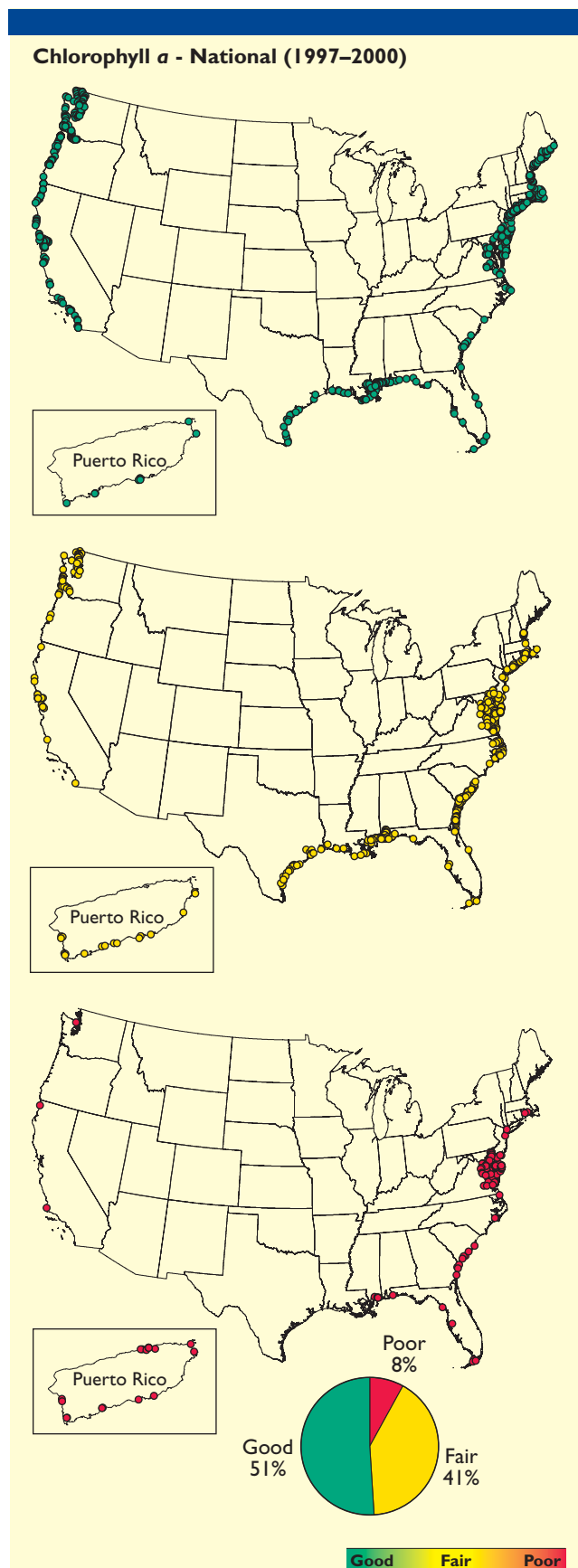


Figure 2-7. National chlorophyll α concentration data (U.S. EPA/NCA).



Figure 2-8. National water clarity condition (U.S. EPA/NCA).

greatest proportion of total estuarine area not meeting this condition are in West Coast (36%), Gulf Coast (29%), Northeast Coast (23%), and Puerto Rico (20%) estuaries.

Dissolved Oxygen

Dissolved oxygen conditions in the nation's estuaries are good. Often, low dissolved oxygen occurs as a result of large algal blooms that sink to the bottom and use oxygen during the process of decay. In addition, low dissolved oxygen concentrations can be the result of stratification due to strong freshwater discharge. Dissolved oxygen is a fundamental requirement for all estuarine life. Low levels of oxygen often accompany the onset of severe bacterial degradation, sometimes resulting in algal scums, fish kills, and noxious odors, as well as loss of habitat and aesthetic values. This, in turn, can result in decreased tourism and recreational water use. The NCA estimates that only about 4% of bottom waters in the nation's estuaries have low dissolved oxygen (Figure 2-9). This estimate describes conditions only during daylight hours. All systems have dissolved oxygen cycles in which higher values are observed during daylight (accompanying oxygen production by phytoplankton) and lower values at night (with only respiration occurring). The NCA estimates do not apply to "dystrophic" systems, in which dissolved oxygen levels are acceptable during daylight hours, but decrease to low (even unacceptable) levels during the night. Many of these systems and the biota associated with them are adapted to this cycle—a natural process of oxygen production during the day and respiration at night—which is common in wetland, swamp, and blackwater ecosystems.

The guideline used in the NCA analysis for poor dissolved oxygen condition is a value below 2 mg/L in bottom waters. The majority of coastal states either use a different criterion, ranging from an average of 4 to 5 mg/L throughout the water column to a specific concentration (usually 4 or 5 mg/L) at mid-water, or include a frequency or duration of time that the low dissolved oxygen concentration must occur (e.g., 20% of observed values). The NCA chose to use 2 mg/L in bottom waters because this level is clearly indicative of potential harm to estuarine organisms. Because so many state agencies use higher concentrations, the NCA evaluated the proportion of waters that have dissolved

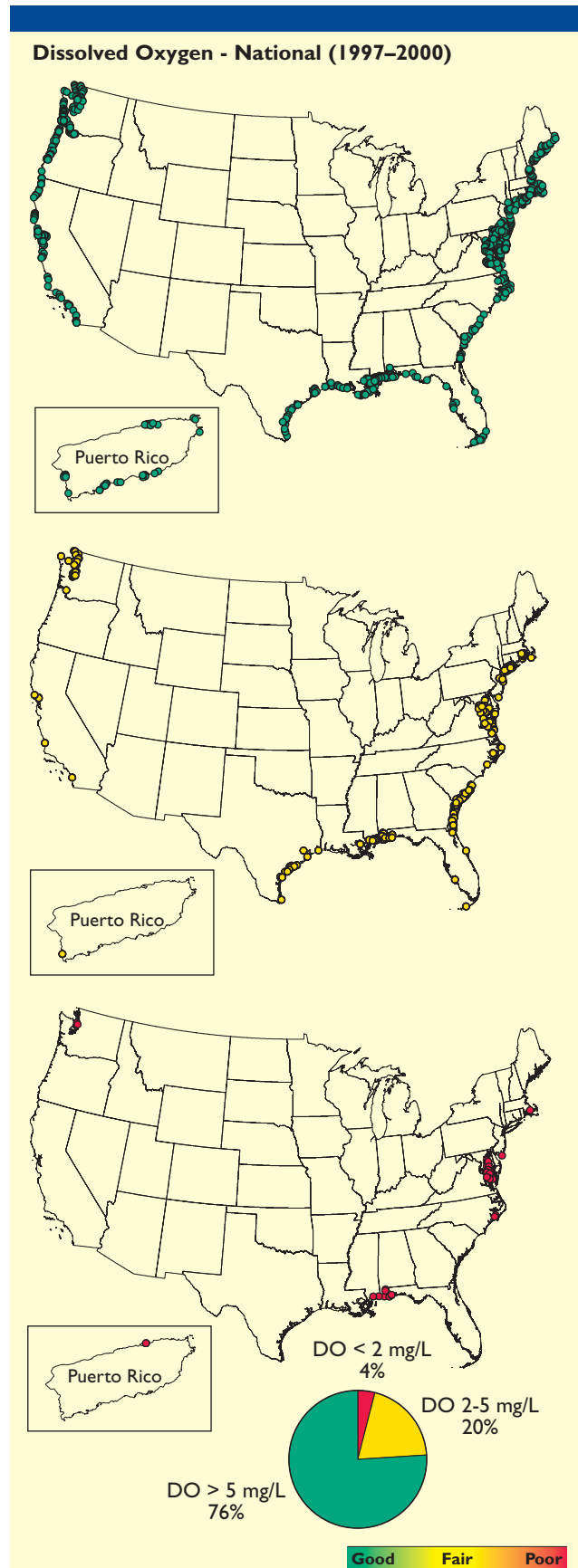


Figure 2-9. National dissolved oxygen concentration data (U.S. EPA/NCA).